

ITEM: 19

SUBJECT: Proposed Amendment to the Sacramento River and San Joaquin River Water Quality Control Plan for the Control of Salt and Boron Discharges into the San Joaquin River – *An Informational Workshop*

BOARD ACTION: Discussion and direction for staff

BACKGROUND: As proposed, the amendment to the Sacramento River and San Joaquin River Water Quality Control Plan (Basin Plan) will establish a control program for point and nonpoint source discharges of salt and boron to the Lower San Joaquin River (LSJR) from the Mendota Dam to the Airport Way Bridge near Vernalis (Vernalis). The proposed control program is intended to implement a Total Maximum Daily Load (TMDL) and bring the LSJR near Vernalis into compliance with the existing salt and boron water quality objectives. No new water quality objectives are proposed as part of this amendment. An executive summary of the proposed amendment and the proposed Basin Plan language is included with this agenda package. The full draft of the staff report and all supporting appendices are available at:

http://www.swrcb.ca.gov/rwqcb5/programs/tmdl/Salt_Boron.htm

The draft Basin Plan Amendment has the following elements:

- Total Maximum Daily Load, including
 - load allocations for nonpoint sources
 - waste load allocations for point sources
- proposed program of implementation
- compliance time schedule to meet water quality objectives and allocations
- estimates of costs to comply with water quality objectives and allocations

The program of implementation proposed for all nonpoint source discharges is the use of waste discharge requirements unless conditions can be met that would allow dischargers to operate under a Management Agency Agreement (MAA) or waiver of waste discharge requirements. These conditions would include required participation in a program to manage their discharges (real-time management described below). The program of implementation proposed for point source discharges is to revise existing or create new NPDES permits with fixed effluent limits set at the Vernalis water quality objectives.

Irrigation supply water imported into the LSJR Basin is a major contributor to the salinity water quality impairment in the LSJR. The United States Bureau of Reclamation (USBR) is the primary supplier of this irrigation water. The program of implementation proposes the use of waste discharge requirements to control this source of salt if, within two

years from the effective date of this control program, a MAA is not established between the Regional Board and the USBR. The MAA would include provisions requiring the U.S. Bureau of Reclamation to a) meet Delta Mendota Canal (DMC) load allocations; or b) provide mitigation and/or dilution flows to create additional assimilative capacity for salt in the LSJR equivalent to salt loads in DMC supply water in excess of their allocation.

Operational flexibility is provided to all dischargers and water users through the option to participate in a Regional Board approved program of real-time management. Real-time management provides the opportunity for dischargers to manage the timing of their discharges such that the quantity of salt conveyed from the basin is maximized while still complying with water quality objectives. Such a program will require development of significant structural and organizational infrastructure. Required elements of a Regional Board approvable real-time program will be specified in waiver conditions. Waiver conditions will be incorporated into the existing agricultural waiver or into a new waiver specific for the control of salt and boron discharges into the LSJR.

Within two years of the effective date of this Basin Plan Amendment, it is proposed that the Regional Board shall: 1) incorporate load allocations into waste discharge requirements; and 2) revise the existing agricultural waiver with conditions to comply with real-time salt load allocations or adopt a new waiver specific for the real-time management of salt and boron discharges into the LSJR. Dischargers that wish to participate in a real-time management program will be required to file a notice of intent to comply with the waiver conditions within one year of the date of adoption of the new or revised waiver.

Sufficient time will be needed to comply with the proposed allocations to allow for the planning, environmental review, design, and construction of facilities, and development of the needed organizational infrastructure to successfully implement the preferred alternative. Without the appropriate infrastructure in place, it will be difficult to achieve compliance with allocations and water quality objectives during low flow periods that may occur in all year types. The proposed date for compliance with the allocations and existing water quality objectives is 20 years from the effective date of the amendment for critically dry years and 16 years from the from the effective date of the amendment for all other water years.

Implementation costs to dischargers are estimated to range from 15 to 133 million dollars per year depending on which alternative is selected. The recommended alternative is also the least expensive alternative to implement because drainage management needs are minimized and allowable discharges to the LSJR are maximized through real-time water quality management. Implementation of the recommended alternative

will cost approximately 15 to 21 million dollars per year.

This workshop will give participants with an opportunity to provide the Regional Board with their views on the proposed Basin Plan Amendment and staff report. A separate hearing will be held, after this workshop, to consider adoption of a proposed amendment to the Basin Plan.

ISSUES:

There is a great deal of controversy regarding this proposed Basin Plan Amendment and the TMDL it is implementing. Following are some of the major issues of concern that have been raised based on the draft technical TMDL and the proposed framework for the Basin Plan Amendment:

- Water quality objectives for salinity in the LSJR near Vernalis are based on flawed data.
- A load-based approach will not produce needed water quality improvements.
- Real-time relaxation of allocations, generally recognized as a critical element to successful implementation, is not sufficiently described.
- Activities that contribute to increased salinity of groundwater, such as municipal and industrial discharges to land, have not been adequately considered.

Following are additional issues of concern that are specific to a geographic area or category of discharger:

- Agricultural and municipal interests in the South and Central Delta (north of the project area for this TMDL) and environmental organizations feel that this TMDL is inadequate to address water quality concerns since no water quality objectives are proposed for the LSJR upstream of Vernalis. There is also concern that the proposed regulation would continue to allow the USBR to mitigate for their contribution to the problem by making releases of water from New Melones Reservoir, which has been characterized as an unreasonable use of water.
- Agricultural interests on the west side of the LSJR, including the San Joaquin River Exchange Contractors, are concerned that their ability to discharge will be reduced or eliminated under the proposed regulation and that the USBR may cease to provide agricultural supply water if they are unable to otherwise mitigate for their contribution to the problem.
- Agricultural interests on the east side of the LSJR are concerned that their ability to discharge will be reduced or eliminated under the proposed regulation. They feel agricultural return flows from the east side help to improve water quality and that: 1) a concentration-based approach should be used, exclusively, to implement the TMDL and 2) control efforts should be focused on major salt sources on the west side of the LSJR.

- Wetland operators and managers are concerned that load limits applied to wetland discharges will constrain their ability to successfully manage wetlands for the benefit of plant and animal species in these managed wetlands.
- USBR has commented that 1) use of Sierra Nevada quality water is inappropriate to represent baseline supply water quality, 2) mean flow rather than low flow conditions should be used to determine base load allocations, 3) inappropriate models were used in the analyses, and 4) the review of salt loading sources was deficient.
- Wastewater treatment plant operators are concerned that use of effluent limits set equal to the Vernalis objective will require them to make further facility improvements to meet waste load allocations.

Mgmt. Review _____

Legal Review _____

4,5 December 2003

Central Valley Regional Water Quality Control Board, Sacramento Office

1 Executive Summary and Background

1.1 Executive Summary

This report provides the technical and policy foundation for a proposed amendment to the water quality control plan (Basin Plan) for the Sacramento River and San Joaquin River Basins. The amendment is intended to implement a Total Maximum Daily Load (TMDL) for Salt and Boron in the Lower San Joaquin River (LSJR). A technical TMDL report has been developed that sets waste load allocations for point sources and load allocations for nonpoint sources. These allocations have been designed to meet existing salt and boron water quality objectives for the LSJR at the Airport Way Bridge near Vernalis. The technical TMDL report for salt and boron in the LSJR is included as Appendix 1.

California Water Code Section 13240 authorizes the Regional Boards to formulate and adopt water quality control plans for all areas within their region. A Basin Plan is the basis for regulatory actions taken for water quality control. The Basin Plan is also used to satisfy parts of Section 303 of the Federal Clean Water Act (CWA) (USEPA, 2002), which requires states to adopt water quality standards. Basin Plans are adopted and amended by the Regional Board through a structured process involving full public participation and state environmental review. Basin Plan amendments do not become effective until approved by the State Water Resources Control Board (State Water Board) and the Office of Administrative Law (OAL). U.S. Environmental Protection Agency (USEPA) approval is required for Basin Plan amendments that affect surface water quality standards. Though this Basin Plan amendment does not propose any changes or modification to the existing water quality standards, it does propose implementation of TMDL, which also requires USEPA approval. A Basin Plan must consist of the following (Water Code Section 13050):

- 1) beneficial uses to be protected
- 2) water quality objectives (WQOs)
- 3) a program of implementation needed for achieving water quality objectives

This proposed Basin Plan amendment focuses on achieving existing salinity and boron water quality objectives for the San Joaquin River at the Airport Way Bridge near Vernalis by establishing a control program for salt and boron discharges to the LSJR. Nonpoint source dischargers can comply with proposed control program by meeting any one of the following conditions:

- a. cease discharge
- b. discharge does not exceed 315µS/cm electrical conductivity
- c. operate under waste discharge requirements that include effluent limits for salt
- d. operate under a waiver of waste discharge requirements for salt and boron discharges to the LSJR

Non point source discharges meeting conditions contained in a waiver of waste discharge requirements for salinity management (or specific conditions for salinity management incorporated into an existing agricultural waiver) will be required to comply with real-time load allocations. Non point source dischargers not meeting these waiver conditions will be required to meet fixed base load allocations.

The fixed base load allocations are designed to protect water quality during low flow conditions. Limiting discharges through fixed load allocations, however, could result in a net salt build-up in the LSJR watershed because salts would continue to be imported to the watershed in supply water but salt exports would be significantly restricted. To overcome this restriction, this control program includes opportunities for dischargers to use real-time allocations to maximize salt exports while still meeting water quality objectives. Real-time load allocations are formulaic, based on actual real-time flow and water quality conditions. Dischargers participating in a Regional Board approved real-time management program would be allowed to use real-time load allocations in lieu of the fixed base load allocations. Real-time load allocations will generally allow more loading to the LSJR than the fixed base load allocations. The benefit of real-time management can be expanded through drainage re-operation. Drainage re-operation involves changing the timing of releases to the LSJR to coincide with periods of assimilative capacity by temporarily storing saline drainage when assimilative capacity is limited, then releasing stored drainage when assimilative capacity becomes available.

The proposed waste load allocations for point source discharges are concentration based and set equal to the existing salinity water quality objectives for the LSJR at the Airport Way Bridge near Vernalis. The Regional Board will revise NPDES permits to incorporate TMDL allocations when the permits are renewed or reopened at the discretion of the Regional Board.

Waste discharge requirements are proposed for the United States Bureau of Reclamation if, within two years from the effective date of this control program, a Management Agency Agreement (MAA) is not established between the Regional Board and the USBR. The MAA shall include provisions requiring the U.S. Bureau of Reclamation to a) Meet DMC load allocations; or b) Provide mitigation and/or dilution flows to create additional assimilative capacity for salt in the SJR equivalent to salt loads in Delta Mendota Canal supply water in excess of their allocation.

Adoption of the proposed Basin Plan amendment will result in the establishment of:

- Fixed load allocations applicable to nonpoint source dischargers regulated under waste discharge requirements
- A method for calculating real-time assimilative capacity and associated real-time salt load limits (available load) based on real-time flow conditions (applicable to dischargers regulated under a waiver of waste discharge requirements or, as appropriate, under new or existing waste discharge requirements when these waste discharge requirements are otherwise required)
- A method for apportioning load allocations to nonpoint source dischargers

- A method for calculating waste load allocations for point source dischargers
- Prioritization, by subarea, for implementing load allocations
- A time schedule, prioritized by subarea, for achieving compliance with waste load allocations and load allocations
- A method for calculating load allocations for salt imported to the LSJR basin by the Delta Mendota Canal of the Central Valley Project.

1.2 Need for a Revision to the Basin Plan

In the 1995 *Water Quality Control Plan for the San Francisco Bay/Sacramento San Joaquin Delta Estuary* (Bay Delta Plan), the State Water Board adopted salinity WQOs for the San Joaquin River at the Airport Way Bridge near Vernalis. In 1999, the State Water Board adopted Water Right Decision 1641, which, in part, implements the salinity standards contained in the 1995 Bay Delta Plan. The 1995 (Bay Delta Plan) and Decision 1641 directed the Central Valley Regional Water Quality Control Board to:

- 1) continue its salt load reduction program, initiated in response to adoption of the 1995 Bay Delta Plan, to reduce annual salt loads to the San Joaquin River by at least 10 percent and to adjust the timing of discharges from low flow to high flow periods
- 2) promptly develop and adopt salinity objectives and a program of implementation for the main stem of the San Joaquin River upstream of Vernalis

Development of a program of implementation to reduce salt loading and to achieve water quality objectives requires revision of the Basin Plan.

Federal law requires establishment of a TMDL for waters not attaining standards. The lower San Joaquin River is currently identified as not attaining standards for salt and boron, necessitating development of a TMDL. Though other methods may be available, a TMDL with both point and nonpoint sources may, in general, only be established by revising the Basin Plan.

A technical TMDL report for salt and boron in the LSJR was developed in January 2002; it contains all of the required elements of a TMDL, including; (1) a problem statement that describes the water body being addressed and reasons for impairment; (2) numeric targets that set quantifiable end-points that the TMDL seeks to achieve; (3) a source analysis that identifies and describes the significant sources of pollutant loading to the LSJR; (4) loading capacity of the water body; and (5) allocation of loads (Oppenheimer and Grober, et. al., 2002). An updated version of this TMDL report is included in this staff report as Appendix 1.

1.3 Background

The LSJR is on California's CWA Section 303(d) list of impaired waters due to elevated concentrations of salt and boron. The CWA requires states to develop TMDLs for all impaired waters. Since the 1940s, mean annual salt concentrations in the LSJR at the Airport Way Bridge near Vernalis have doubled and boron levels have increased

significantly. Water quality monitoring data collected by the Regional Board and others indicates that WQOs for salinity and boron are frequently exceeded in the LSJR during certain times of the year and under certain flow regimes. Water quality data collected during water years 1986 to 1998 indicates that the non-irrigation season salinity objective of 1,000 $\mu\text{S}/\text{cm}$ (applies 1 Sep.- 31 Mar.), was exceeded 11 percent of the time and the irrigation season salinity objective of 700 $\mu\text{S}/\text{cm}$ (applies 1 Apr.- 31 Aug.) was exceeded 49 percent of the time at the Airport Way Bridge Near Vernalis. Consequently, the river does not fully support all of its designated beneficial uses.

The salt and boron water quality impairment in the LSJR has occurred, in large part, as a result of large-scale water development coupled with extensive agricultural land use and associated agricultural discharges in the watershed. LSJR flows have been severely diminished by the construction and operation of dams and diversions and the resulting consumptive use of water. Most of the natural flows from the Upper San Joaquin River (SJR) and its headwaters are diverted at the Friant Dam via the Friant-Kern Canal to irrigate crops outside the SJR Basin. Diverted natural river flows have been replaced with poorer quality (higher salinity) imported water from the Sacramento-San Joaquin Delta (Delta) that is primarily used to irrigate crops on the west side of the LSJR basin. Surface and subsurface agricultural discharges are the largest sources of salt and boron loading to the LSJR; and river water quality is therefore heavily influenced by irrigation return flows during the irrigation season. Water quality generally improves downstream as higher quality flows from the Merced, Tuolumne, and Stanislaus Rivers dilute salt and boron concentrations in the main stem of the LSJR.

1.3.1 Watershed setting

The SJR watershed is bordered by the Sierra Nevada Mountains on the east, the Coast Range on the west, the Delta to the north, and the Tulare Lake Basin to the south. From its source in the Sierra Nevada Mountains, the San Joaquin River flows southwesterly until it reaches Friant Dam. Below Friant Dam, the SJR flows westerly to the center of the San Joaquin Valley near Mendota, where it turns northwesterly to eventually join the Sacramento River in the Delta. The main stem of the entire SJR is about 300 miles long and drains approximately 13,500 square miles.

The major tributaries to the San Joaquin River upstream of the Airport Way Bridge near Vernalis (the boundary of Delta) are on the east side of the San Joaquin Valley, with drainage basins in the Sierra Nevada Mountains. These major east side tributaries are the Stanislaus, Tuolumne, and Merced Rivers. The Consumnes, Mokelumne, and Calaveras Rivers flow into the San Joaquin River downstream of the Airport Way Bridge near Vernalis. Several smaller, ephemeral streams flow into the SJR from the west side of the valley. These streams include Hospital, Ingram, Del Puerto, Orestimba, Panoche, and Los Banos Creeks. All have drainage basins in the Coast Range, flow intermittently, and contribute sparsely to water supplies. Mud Slough (north) and Salt Slough also drain the Grassland Watershed on the west side of San Joaquin Valley. During the irrigation season, surface and subsurface agricultural return flows contribute greatly to these west side creeks and sloughs.

1.3.2 Project Area

The geographic scope of the salt and boron TMDL and this Basin Plan amendment is limited to a 130-mile reach of the SJR extending from downstream of the Mendota Dam to the Airport Way Bridge near Vernalis (Figure 1-1). The LSJR watershed is defined as the area draining to the San Joaquin River downstream of the Mendota Dam and upstream of Vernalis. For basin planning purposes, the LSJR watershed excludes areas upstream of dams on the major Eastside reservoirs: New Don Pedro, New Melones, Lake McClure, and similar Eastside reservoirs in the LSJR system (including all land within Tuolumne and Mariposa Counties). The southeastern boundary of the TMDL project area is formed by the LSJR (from the Friant Dam to the Mendota pool). The LSJR Watershed, as defined here, drains approximately 2.9 million acres, which includes approximately 1.4 million acres of agricultural land use.

More information on the project area is contained in Appendix 1, a Regional Board staff report entitled *A Total Maximum Daily Load for Salinity and Boron in the Lower San Joaquin River*.

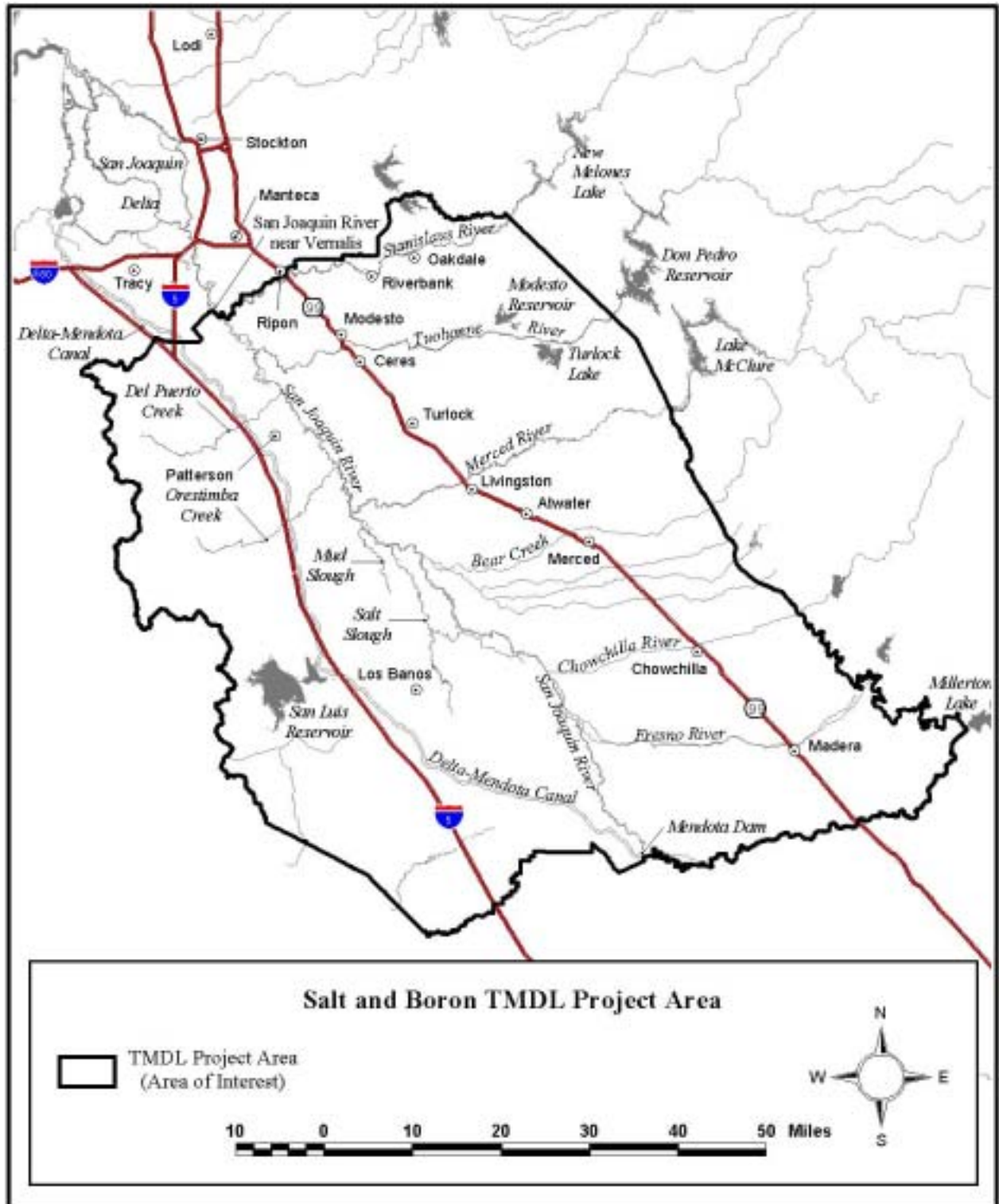


Figure 1-1. Lower San Joaquin River Watershed

1.4 Organization of the Basin Plan Amendment Staff Report

The Basin Plan Amendment staff report is organized into the following sections. The introduction in Section 1 is followed by proposed changes to the Basin Plan in Section 2. A review of the existing policies that pertain to this Basin Plan amendment are contained in Section 3, and an evaluation of the proposed changes to each of the Basin Plan chapters is contained in Section 4.

Water code section 13141 requires that prior to implementation of any agricultural water quality control program, an estimate of the total cost of such program and identification of sources of funding be indicated in the Basin Plan. Additionally, water code section 13241 requires consideration of economics for adoption of new WQOs. The required economic analysis is included in Appendix 4 and summarized in Section 5.

Since the Basin Plan amendment process is a certified regulatory program pursuant to the California Environmental Quality Act (CEQA), the Basin Plan amendment staff report must serve as a substitute Environmental Document (Environmental Impact Report or Negative Declaration). Accordingly, a CEQA review is contained in Section 6, and a description of public participation is contained in Section 7.

2 Proposed Basin Plan Amendment

The proposed Basin Plan amendment consists of additions and modifications to two chapters of the current Basin Plan. Proposed amendment language is contained in Section 2.1 of this staff report. Attachment A contains a draft Regional Board resolution to adopt the proposed Basin Plan amendment. Following is a description of the proposed amendments to the Basin Plan in the order in which they are presented in the Basin Plan.

Proposed Changes to Basin Plan Chapter I: Introduction

Chapter 1 of the Basin Plan contains, among other things, a description of the major basins and their boundaries. This Basin Plan Amendment proposes to:

- 1) correct an inaccurate description of the planning boundary between the San Joaquin River Basin and the Tulare Lake Basin
- 2) add a detailed description of the LSJR watershed and descriptions of several smaller geographic subareas within the LSJR watershed
- 3) revise the description of the Grassland Watershed

The proposed amendment provides a description of the lower San Joaquin River Basin along with descriptions of several smaller geographic areas within this Basin. These smaller geographic areas are referred to as major subareas. In some cases major subareas have been subdivided into minor subareas to allow for increased resolution in identifying pollution sources and increased focus for implementation of regulations and pollution

controls. The existing description of the Grassland Watershed will be deleted and replaced by one of the major subareas. Descriptions of the major and minor subareas listed in Table 2-1 will be added to Chapter 1 of the Basin Plan. Detailed technical descriptions of each sub-areas are proposed for inclusion in a new appendix to the Basin Plan. These Technical descriptions are contained in Appendix C of the Technical TMDL report.

Table 2-1: San Joaquin River Subareas

| LOWER SAN JOAQUIN RIVER WATERSHED | Major Subarea | | Minor Subarea (subdivisions of major subareas) | |
|-----------------------------------|---------------|--------------------------|--|--------------------------------------|
| | 1 | SJR upstream Salt Slough | 1a | Bear Creek (effective drainage area) |
| | | | 1b | Fresno-Chowchilla |
| | 2 | Grassland | ----- | |
| | 3 | East Valley Floor | 3a | Northeast Bank |
| | | | 3b | North Stanislaus |
| | | | 3c | Stevinson |
| | | | 3d | Turlock Area |
| | 4 | Northwest Side | 4a | Greater Orestimba |
| | | | 4b | Westside Creeks |
| | | | 4c | Vernalis North |
| | 5 | Merced River | ----- | |
| | 6 | Tuolumne River | ----- | |
| | 7 | Stanislaus River | ----- | |

Proposed Changes to Basin Plan Chapter II: Existing and Potential Beneficial Uses

This amendment does not propose any revisions to the beneficial uses.

Proposed Changes to Basin Plan Chapter III: Water Quality Objectives

This amendment does not propose any revisions to the water quality objectives.

Proposed Changes to Basin Plan Chapter IV: Implementation

This revision proposes to append an existing Basin Plan Section titled ‘Agricultural Drainage Discharges in the San Joaquin Basin’ by adding an additional subsection titled ‘Control Program for Salt and Boron Discharges into the Lower San Joaquin River’ beginning on page IV-33.00 of the Basin Plan. The proposed amendment is intended to result in long-term achievement of the existing salt and boron WQOs in the LSJR at the Airport Way Bridge near Vernalis by establishing salinity waste load allocations for point sources and salinity load allocations for nonpoint sources. Attainment of salt load allocations are expected to result in achievement of the existing boron water quality objective at Vernalis, therefore, explicit boron allocations are not needed nor are they proposed.

Nonpoint source dischargers can comply with the proposed control program by meeting any one of the following conditions:

- a. cease discharge

- b. discharge does not exceed 315µS/cm electrical conductivity
- c. operate under waste discharge requirements that include effluent limits for salt
- d. operate under a waiver of waste discharge requirements for salt and boron discharges to the LSJR

Nonpoint source dischargers operating under waste discharge requirements are required to meet fixed monthly base load allocations specified as effluent limits and dischargers operating under a waiver of waste discharge requirements are required to participate in a Regional Board approved real-time management program and to meet real-time salt load allocations. The actual fixed monthly base load allocations and the method use to calculate real-time load allocations are specified in Table IV-7 of the proposed Basin Plan Amendment.

Waste load allocations for point source discharges are concentration based and set equal to the existing water quality objectives for the LSJR at the Airport way Bridge near Vernalis. The proposed amendment includes a method used to prioritize implementation of the control program by geographic subarea and type of discharge. Priorities for implementation are then tied to a schedule for compliance that ranges from 8-12 years for high priority subareas and 16-20 years for low priority subareas.

Waste discharge requirements are proposed for the United States Bureau of Reclamation if, within two years from adoption of this control program, a Management Agency Agreement (MAA) is not established between the Regional Board and the USBR. The MAA shall include provisions requiring the U.S. Bureau of Reclamation to a) Meet DMC load allocations; or b) Provide mitigation and/or dilution flows to create additional assimilative capacity for salt in the SJR equivalent to salt loads in Delta Mendota Canal supply water in excess of their allocation.

A discussion of the costs associated with the proposed salt and boron control program and the potential funding sources will be added to an existing Basin Plan section titled 'Estimated Costs of Agricultural Water Quality Control Programs and Potential Funding Sources'.

Basin Plan Chapter V: Surveillance and monitoring

No revisions to Chapter 5 are proposed

2.1 Proposed Amendments to the Basin Plan

Following are experts from Basin Plan Chapters I and IV shown similar to how they will appear after the proposed amendment is adopted. Deletions are indicated as strike-through text (~~deleted text~~) and additions are shown as underlined text (added text). All capitalized italics text is included as added notation (*NOTATION TEXT*) and will not appear in the Basin Plan. All other text changes are shown accurately, however, formatting and pagination will change.

INTRODUCTION

BASIN DESCRIPTION

This Basin Plan covers the entire area included in the Sacramento and San Joaquin River drainage basins (see maps in pocket* and Figure II-1). The basins are bound by the crests of the Sierra Nevada on the east and the Coast Range and Klamath Mountains on the west. They extend some 400 miles from the California - Oregon border southward to the headwaters of the San Joaquin River.

*NOTE: The planning boundary between the San Joaquin River Basin and the Tulare Lake Basin follows ~~the northern boundary of the Little Panoche Creek basin~~ the southern watershed boundaries of the Little Panoche Creek, Moreno Gulch, and Capita Canyon to boundary of the Westlands Water District. From here, the boundary follows the northern edge of the Westlands Water District until its intersection with the Firebaugh Canal Company's Main Lift Canal. The basin boundary then follows the Main Lift Canal to the Mendota Pool and continues eastward along the channel of the San Joaquin River to Millerton Lake in the Sierra Nevada foothills, and then follows along the southern boundary of the San Joaquin River drainage basin.

The Sacramento River and San Joaquin River Basins cover about one fourth of the total area of the State and over 30% of the State's irrigable land. The Sacramento and San Joaquin Rivers furnish roughly 51% of the State's water supply. Surface water from the two drainage basins meet and form the Delta, which ultimately drains to San Francisco Bay. Two major water projects, the Federal Central Valley Project and the State Water Project, deliver water from the Delta to Southern California, the San Joaquin Valley, Tulare Lake Basin, the San Francisco Bay area, as well as within the Delta boundaries.

The Delta is a maze of river channels and diked islands covering roughly 1,150 square miles, including 78 square miles of water area. The legal boundary of the Delta is described in Section 12220 of the Water Code (also see Figure III-1 of this Basin Plan).

Ground water is defined as subsurface water that occurs beneath the ground surface in fully saturated zones within soils and other geologic formations. Where ground water occurs in a saturated geologic unit that contains sufficient permeability and thickness to yield significant quantities of water to wells or springs, it can be defined as an aquifer (USGS, Water Supply Paper

1988, 1972). A ground water basin is defined as a hydrogeologic unit containing one large aquifer or several connected and interrelated aquifers (Todd, *Groundwater Hydrology*, 1980).

Major ground water basins underlie both valley floors, and there are scattered smaller basins in the foothill areas and mountain valleys. In many parts of the Region, usable ground waters occur outside of these currently identified basins. There are water-bearing geologic units within ground water basins in the Region that do not meet the definition of an aquifer. Therefore, for basin planning and regulatory purposes, the term "ground water" includes all subsurface waters that occur in fully saturated zones and fractures within soils and other geologic formations, whether or not these waters meet the definition of an aquifer or occur within identified ground water basins.

Sacramento River Basin

The Sacramento River Basin covers 27,210 square miles and includes the entire area drained by the Sacramento River. For planning purposes, this includes all watersheds tributary to the Sacramento River that are north of the Cosumnes River watershed. It also includes the closed basin of Goose Lake and drainage sub-basins of Cache and Putah Creeks.

The principal streams are the Sacramento River and its larger tributaries: the Pit, Feather, Yuba, Bear, and American Rivers to the east; and Cottonwood, Stony, Cache, and Putah Creeks to the west. Major reservoirs and lakes include Shasta, Oroville, Folsom, Clear Lake, and Lake Berryessa.

DWR Bulletin 118-80 identifies 63 ground water basins in the Sacramento watershed area. The Sacramento Valley floor is divided into 2 ground water basins. Other basins are in the foothills or mountain valleys. There are areas other than those identified in the DWR Bulletin with ground waters that have beneficial uses.

San Joaquin River Basin

The San Joaquin River Basin covers 15,880 square miles and includes the entire area drained by the San Joaquin River. It includes all watersheds tributary to the San Joaquin River and the Delta south of the

Sacramento River and south of the American River watershed. The southern planning boundary is described in the first paragraph of the previous page.

The principal streams in the basin are the San Joaquin River and its larger tributaries: the Cosumnes, Mokelumne, Calaveras, Stanislaus, Tuolumne, Merced, Chowchilla, and Fresno Rivers. Major reservoirs and lakes include Pardee, New Hogan, Millerton, McClure, Don Pedro, and New Melones.

DWR Bulletin 118-80 identifies 39 ground water basins in the San Joaquin watershed area. The San Joaquin Valley floor is divided into 15 separate ground water basins, largely based on political considerations. Other basins are in the foothills or mountain valleys. There are areas other than those identified in the DWR Bulletin with ground waters that have beneficial uses.

Grassland Watershed

The Grassland watershed is a valley floor sub-basin of the San Joaquin River Basin. The portion of the watershed for which agricultural subsurface drainage policies and regulations apply covers an area of approximately 370,000 acres and is bounded on the north by the alluvial fan of Orestimba Creek and by the Tulare Lake Basin to the south. The San Joaquin River forms the eastern boundary and Interstate Highway 5 forms the approximate western boundary. The San Joaquin River forms a wide flood plain in the region of the Grassland watershed.

The hydrology of the watershed has been irreversibly altered due to water projects and is presently governed by land uses. These uses are primarily, managed wetlands and agriculture. The wetlands form important waterfowl habitat for migratory waterfowl using the Pacific Flyway. The alluvial fans of the western and southern portions of the watershed contain salts and selenium which can be mobilized through irrigation practices and can impact beneficial uses of surface waters and wetlands if not properly regulated.

Lower San Joaquin River Watershed and Subareas

Technical descriptions of the Lower San Joaquin River (LSJR) and its component subareas are contained in Appendix 41. General descriptions follow: The LSJR watershed encompasses approximately 4,600 square miles in Merced County and portions of Fresno, Madera, San Joaquin, and Stanislaus counties. For planning purposes, the LSJR watershed is defined as the area draining to the San Joaquin River downstream

of the Mendota Dam and upstream of the Airport Way Bridge near Vernalis, excluding the areas upstream of dams on the major Eastside reservoirs: New Don Pedro, New Melones, Lake McClure, and similar Eastside reservoirs in the LSJR system. The LSJR watershed excludes all lands within Calaveras, Tuolumne, and Mariposa Counties. The LSJR watershed has been subdivided into seven major sub areas. In some cases major subareas have been further subdivided into minor subareas to facilitate more effective and focused water quality planning (Table I-1).

Table I-1 Lower San Joaquin River Subareas

| Major Subareas | | Minor Subareas | |
|----------------|------------------------------|----------------|-------------------|
| 1 | SJLR upstream of Salt Slough | 1a | Bear Creek |
| | | 1b | Fresno-Chowchilla |
| 2 | Grassland | -- -- | |
| 3 | East Valley Floor | 3a | Northeast Bank |
| | | 3b | North Stanislaus |
| | | 3c | Stevinson |
| | | 3d | Turlock Area |
| 4 | Northwest Side | 4a | Greater Orestimba |
| | | 4b | Westside Creeks |
| | | 4c | Vernalis North |
| 5 | Merced River | -- -- | |
| 6 | Tuolumne River | -- -- | |
| 7 | Stanislaus River | -- -- | |

1. Lower San Joaquin River upstream of Salt Slough

This sub-area drains approximately 1,470 square miles on the east side of the LSJR upstream of the Salt Slough confluence. The sub-area includes the portions of the Bear Creek, Chowchilla River and Fresno River watersheds that are contained within Merced and Madera Counties. The northern boundary of the sub-area generally abuts the Merced River Watershed. The western and southern boundaries follow the San Joaquin River from the Lander Avenue bridge to Friant, except for the lands within the Columbia Canal Company, which are excluded. Columbia Canal Company lands are included in the Grassland Sub-area.

1a. Bear Creek (effective drainage area)

This minor subarea is a 520 square mile subset of lands within the LSJR upstream of Salt Slough Sub-area. The Bear Creek Minor Subarea is predominantly comprised of the portion of the Bear Creek Watershed that is contained within Merced County.

1b. Fresno-Chowchilla

The Fresno-Chowchilla Minor Subarea is comprised of approximately 950 square miles of land within the southern portion of the LSJR upstream of Salt Slough Subarea. This minor

subarea is located in southeastern Merced County and western Madera County and contains the land area that drains into the LSJR between Sack Dam and the Bear Creek confluence, including the drainages of the Fresno and Chowchilla Rivers.

2. Grassland

The Grassland Sub-area drains approximately 1,400 square miles on the west side of the LSJR in portions of Merced, Stanislaus, and Fresno Counties. This sub-area includes the Mud Slough, Salt Slough, and Los Banos Creek watersheds. The eastern boundary of this subarea is generally formed by the LSJR between the Merced River confluence and the Mendota Dam. The Grassland Sub-area extends across the LSJR, into the east side of the San Joaquin Valley, to include the lands within the Columbia Canal Company. The western boundary of the sub-area generally follows the crest of the Coast Range with the exception of lands within San Benito County, which are excluded. For purposes of control programs in this Basin Plan, the Grassland Subarea is alternately called the Grassland Watershed.

3. East Valley Floor

This sub-area includes approximately 412 square miles of land on the east side of the LSJR that drains directly to the LSJR between the Airport Way Bridge near Vernalis and the Salt Slough confluence. The sub-area is largely comprised of the land in between the major east-side drainages of the Tuolumne, Stanislaus, and Merced Rivers. This sub-area lies within central Stanislaus County and north-central Merced County. Numerous drainage canals, including the Harding Drain and natural drainages, drain this sub-area.

3a. Northeast Bank

This minor subarea of the East Valley Floor contains all of the land draining into the east side San Joaquin River between the Maze Boulevard Bridge and the Crows Landing Road Bridge. The Northeast Bank covers approximately 120 square miles in central Stanislaus County.

3b. North Stanislaus

The North Stanislaus minor subarea is a subset of lands within the East Valley Floor Subarea. This minor subarea drains approximately 68 square miles of land between the Stanislaus and Tuolumne River watersheds that flows into the San Joaquin River between the Airport Way Bridge near Vernalis and the Maze Boulevard Bridge.

3c. Stevinson

This minor subarea of the East Valley Floor contains all of the land draining to the LSJR between the Merced River confluence and the Lander Avenue (Highway 165) Bridge. The Stevinson Minor Subarea occupies approximately 44 square miles in north-central Merced County.

3d. Turlock Area

This minor subarea of the East Valley Floor contains all of the land draining to the LSJR between the Crows Landing Road Bridge and the Merced River confluence. The Turlock Area Minor Subarea occupies approximately 180 square miles in south-central Stanislaus County and northern Merced County.

4. Northwest Side

This 609 square mile area generally includes the lands on the West side of the LSJR between the Airport Way Bridge near Vernalis and the Merced River confluence. This sub-area includes the entire drainage area of Orestimba, Del Puerto, and Hospital/Ingram Creeks. The eastern Boundary of the sub-area follows the LSJR from Vernalis to the Merced River confluence and the western boundary follows the crest of the Coast Range. The sub-area is primarily located in Western Stanislaus County except for a small area that extends into Merced County near the town of Gustine and the Central California Irrigation District Main Canal.

4a. Greater Orestimba

The Greater Orestimba Minor Subarea is a 300 square mile subset of the Northwest Side Subarea located in southwest Stanislaus County and a small portion of western Merced County. It contains the entire Orestimba Creek watershed and the remaining area that drains into the LSJR from the west between the Crows Landing Road Bridge and the confluence of the Merced River.

4b. Westside Creeks

This Minor Subarea is comprised of 300 square miles of the Northwest Side Subarea in western Stanislaus County. It consists of the areas that drain into the west side of the San Joaquin River between Maze Boulevard and Crows Landing Road, including the drainages of Del Puerto, Hospital, and Ingram Creeks.

4c. Vernalis North

The Vernalis North Minor Subarea is a 9 square mile subset of land within the most northern portion of the Northwest Side Subarea. It contains the land draining to the San Joaquin River from the west between the Maze Boulevard Bridge and the Airport Way Bridge near Vernalis.

5. Merced River

This 290 square mile subarea is comprised of the Merced River watershed downstream of the Merced-Mariposa county line and upstream of the River Road Bridge. The Merced River subarea includes a 13-square-mile “island” of land (located between the East Valley Floor and the Tuolumne River Subareas) that is hydrologically connected to the Merced River by the Highline Canal.

6. Tuolumne River

This 300 square mile subarea is comprised of the Tuolumne River watershed downstream of the Stanislaus-Tuolumne county line, including the drainage of Turlock Lake, and upstream of the Shiloh Road Bridge.

7. Stanislaus River

This 150 square mile subarea is comprised of the Stanislaus River watershed downstream of the Stanislaus-Calaveras county line and upstream of Caswell State Park.

SKIP TO CHAPTER IV: IMPLEMENTATION

CONTINUOUS PLANNING FOR IMPLEMENTATION OF WATER QUALITY CONTROL

In order to effectively protect beneficial uses, the Regional Water Board updates the Basin Plan regularly in response to changing water quality conditions. The Regional Water Board is periodically apprised of water quality problems in the Sacramento and San Joaquin River Basins, but the major review of water quality is done every three years as part of the Triennial Review of water quality standards.

During the triennial review, the Regional Water Board holds a public hearing to receive comments on actual and potential water quality problems. A workplan is prepared which identifies the control actions that will be implemented over the succeeding three years to address the problems. The actions may include or result in revision of the Basin Plan's water quality standards if that is an appropriate problem remedy. Until such time that a basin plan is revised, the triennial review also serves to reaffirm existing standards.

The control actions that are identified through the triennial review process are incorporated into the Basin Plan to meet requirements to describe actions (to achieve objectives) and a time schedule of their implementation as called for in the Water Code, Section 13242(a) and (b). The actions recommended in the most recent triennial review are described in the following section.

ACTIONS AND SCHEDULE TO ACHIEVE WATER QUALITY OBJECTIVES

The Regional Water Board expects to implement the actions identified below over the fiscal year (FY) period 1993/1994 through 1995/1996. The problems to which the actions respond were identified as a result of the Regional Water Board's 1993 Triennial Review. The actions and schedules assume that the Regional Water Board has available a close approximation of the mix and level of resources it had in FY 1993/1994. The actions are identified by major water quality problem categories.

Agricultural Drainage Discharges in the San Joaquin River Basin

Water quality in the San Joaquin River has degraded significantly since the late 1940s. During this period, salt concentrations in the River, near Vernalis, have doubled. Concentrations of boron, selenium, molybdenum and other trace elements have also increased. These increases are primarily due to reservoir development on the east side tributaries and upper basin for agricultural development, the use of poorer quality, higher salinity, Delta water in lieu of San Joaquin River water on west side agricultural lands and drainage from upslope saline soils on the west side of the San Joaquin Valley. Point source discharges to surface waters only contribute a small fraction of the total salt and boron loads in the San Joaquin River.

The water quality degradation in the River was identified in the 1975 Basin Plan and the Lower San Joaquin River was classified as a Water Quality Limited Segment. At that time, it was envisioned that a Valley-wide Drain would be developed and these subsurface drainage water flows would then be discharged outside the Basin, thus improving River water quality. However, present day development is looking more toward a regional solution to the drainage water discharge problem rather than a valley-wide drain.

Because of the need to manage salt and other pollutants in the River, the Regional Water Board began developing a Regional Drainage Water Disposal Plan for the Basin. The development began in FY 87/88 when Basin Plan amendments were considered by the Water Board in FY 88/89. The amendment development process included review of beneficial uses, establishment of water quality objectives, and preparation of a regulatory plan, including a full implementation plan. The regulatory plan emphasized achieving objectives through reductions in drainage volumes and pollutant loads through best management practices and other on-farm methods. ~~Additional regulatory steps will be considered based on achievements of water quality goals and securing of adequate resources.~~

The 88/89 amendment emphasized toxic elements in subsurface drainage discharges. The Regional Water Board however still recognizes salt management as the most serious long-term issue on the San Joaquin River. Salinity impairment in the San Joaquin River remains a persistent problem as salinity water quality objectives continue to be exceeded. The Regional Board adopted

the following control program for salt and boron in the San Joaquin River to address salt and boron impairment and to bring the river into compliance with water quality objectives. Additionally, tThe Regional Water Board will continue as an active participant in the San Joaquin River Management Program implementation phase, as authorized by AB 3048, to promote salinity management schemes including timed discharge releases, real-time monitoring and source control.

Control program for subsurface agricultural drainage discharges into the San Joaquin River

Per the amendment to the Basin Plan for San Joaquin River subsurface agricultural drainage, approved by the State Water Board in Resolution No. 96-078 and incorporated herein, the following actions will be implemented.

1. In developing control actions for selenium, the Regional Board will utilize a priority system which focuses on a combination of sensitivity of the beneficial use to selenium and the environmental benefit expected from the action.
2. Control actions which result in selenium load reduction are most effective in meeting water quality objectives.
3. With the uncertainty in the effectiveness of each control action, the regulatory program will be conducted as a series of short-term actions that are designed to meet long-term water quality objectives.
4. Best management practices, such as water conservation measures, are applicable to the control of agricultural subsurface drainage.
5. Performance goals will be used to measure progress toward achievement of water quality objectives for selenium. Prohibitions of discharge and waste discharge requirements will be used to control agricultural subsurface drainage discharges containing selenium. Compliance with performance goals and water quality objectives for nonpoint sources will occur no later than the dates specified in Table IV-4.
6. Waste discharge requirements will be used to control agricultural subsurface drainage discharges containing selenium and may be used to control discharges containing other toxic trace elements.
7. Selenium load reduction requirements will be incorporated into waste discharge requirements as effluent limits as necessary to ensure that the selenium water quality objectives in the San Joaquin River downstream of the Merced River inflow is achieved. The Board intends to implement a TMDL after public review.

Table IV-4. Compliance Time Schedule for Meeting the 4-day Average and Monthly Mean Water Quality Objective for Selenium

Selenium Water Quality Objectives (in bold) and Performance Goals (in italics)

| Water Body/Water Year Type ¹ | 1 October 1996 | 1 October 2002 | 1 October 2005 | 1 October 2010 |
|--|----------------------------|---------------------------|----------------------------|--------------------------|
| Salt Slough and Wetland Water Supply Channels listed in Appendix 40 | 2 µg/L monthly mean | | | |
| San Joaquin River below the Merced River; Above Normal and Wet Water Year types ¹ | | <i>5µg/L monthly mean</i> | 5 µg/L 4-day avg. | |
| San Joaquin River below the Merced River; Critical, Dry, and Below Normal Water Year types | | <i>8µg/L monthly mean</i> | <i>5 µg/L monthly mean</i> | 5 µg/L 4-day avg. |
| Mud Slough (north) and the San Joaquin River from Sack Dam to the Merced River | | | | 5 µg/L 4-day avg. |

¹ The water year classification will be established using the best available estimate of the 60-20-20 San Joaquin Valley water year hydrologic classification (as defined in Footnote 17 for Table 3 in the State Water Resources Control Board's *Water Quality Control Plan for the San Francisco Bay/Sacramento-San Joaquin Delta Estuary*, May 1995) at the 75% exceedance level using data from the Department of Water Resources Bulletin 120 series. The previous water year's classification will apply until an estimate is made of the current water year.

8. Selenium effluent limits established in waste discharge requirements will be applied to the discharge of subsurface drainage water from the Grassland watershed. In the absence of a regional entity to coordinate actions on the discharge, the Regional Board will consider setting the effluent limits at each drainage water source (discharger) to ensure that beneficial uses are protected at all points downstream.

9. Upslope irrigations and water facility operators whose actions contribute to subsurface drainage flows will participate in the program to control discharges.
10. Public and private managed-wetlands will participate in the program to achieve water quality objectives.
11. Achieving reductions in the load of selenium discharged is highly dependent upon the effectiveness of individual actions or technology not currently available; therefore, the Regional Board will review the waste discharge requirements and compliance schedule at least every 5 years.
12. All those discharging or contributing to the generation of agricultural subsurface drainage will be required to submit for approval a short-term (5-year) drainage management plan designed to meet interim milestones and a long-term drainage management plan designed to meet final water quality objectives.
13. An annual review of the effectiveness of control actions taken will be conducted by those contributing to the generation of agricultural subsurface drainage.
14. Evaporation basins in the San Joaquin Basin will be required to meet minimum design standards, have waste discharge requirements and be part of a regional plan to control agricultural subsurface drainage.
15. The Regional Board staff will coordinate with US EPA and the dischargers on a study plan to support the development of a site specific selenium water quality objective for the San Joaquin River and other effluent dominated waterbodies in the Grassland watershed.
16. The Regional Board will establish water quality objectives for salinity for the San Joaquin River.

Control program for salt and boron discharges into the lower San Joaquin River

The goal of the salt and boron control program is to achieve compliance with salt and boron water quality objectives without restricting the ability of dischargers to export salt out of the San Joaquin River basin.

For the purpose of this control program, nonpoint source land uses include all irrigated lands and nonpoint source discharges are discharges from irrigated lands.

Irrigated lands are lands where water is applied for producing crops and, for the purpose of this control program, includes, but is not limited to, land planted to row, field and tree crops as well as commercial nurseries, nursery stock production, managed wetlands, and rice production.

The salt and boron control program establishes salt load limits to achieve compliance at the Airport Way Bridge near Vernalis with salt and boron water quality objectives for the LSJR. The Regional Board establishes a method for determining the maximum allowable salt loading to the LSJR. Load allocations are established for nonpoint sources and waste load allocations are established for point sources.

Load allocations to specific dischargers or groups of dischargers are proportionate to the area of nonpoint source land use contributing to the discharge.

Control actions that result in salt load reductions will be effective in the control of boron.

Per the amendment to the Basin Plan for control of salt and boron discharges into the lower San Joaquin River (LSJR) basin, approved by the Regional Board in Resolution No. 2003-xx and incorporated herein, the following actions will be implemented.

1. The Regional Board shall use waivers of waste discharge requirements or waste discharge requirements to apportion load allocations to each of the following seven geographic sub-areas that comprise the LSJR:
 - a) San Joaquin River Upstream of Salt Slough
 - b) Grassland
 - c) Northwest Side
 - d) East Valley Floor
 - e) Merced River
 - f) Tuolumne River
 - g) Stanislaus River

These sub-areas are described in Chapter 1 and in more detail in Appendix 41.

2. Dischargers of irrigation return flows from irrigated lands are in compliance with this control program if they meet any of the following conditions:
 - a. Cease discharge
 - b. Discharge does not exceed 315µS/cm electrical conductivity (based on a 30 day running average)
 - c. Operate under waste discharge requirements that include effluent limits for salt
 - d. Operate under a waiver of waste discharge requirements for salt and boron discharges to the LSJR
3. The Regional Board will adopt a waiver of waste discharge requirements for salinity management, or incorporate into an existing agricultural waiver, the conditions required to participate in a Regional Board approved real-time management program. Load allocations for nonpoint source dischargers participating in a Regional Board approved real-time management program are described in table IV-7.
4. The Regional Board will adopt waste discharge requirements with fixed monthly base load allocations specified as effluent Limits for nonpoint source discharges that do not meet conditions specified in a waiver of waste discharge requirements for salinity management.
5. Fixed monthly base load allocations and the method use to calculate real-time load allocations are specified in Table IV-7.

Waste Load Allocations are established for point sources of salt in the basin. NPDES permitted discharges will not exceed the salinity water quality objectives established for the LSJR at the Airport Way Bridge near Vernalis. The Regional Board will revise NPDES permits to incorporate TMDL allocations when the permits are renewed or reopened at the discretion of the Regional Board.

6. Supply water credits are established for irrigators that receive supply water from the Delta Mendota Canal (DMC) or the LSJR between the confluence of the Merced River and the Airport Way Bridge near Vernalis as described in Table IV-7.

7. Supply water load allocations are established for salts in irrigation water imported to the LSJR Watershed from the Sacramento/San Joaquin River Delta as described in Table IV-7.

The Regional Board will attempt to enter into a Management Agency Agreement (MAA) with State Water Resources Control Board and the U.S. Bureau of Reclamation to address salt imports from the DMC to the LSJR watershed. The MAA shall include provisions requiring the U.S. Bureau of Reclamation to:

- a. Meet DMC load allocations; or
- b. Provide mitigation and/or dilution flows to create additional assimilative capacity for salt in the LSJR equivalent to DMC salt loads in excess of their allocation

The Regional Board shall request a report of waste discharge from the U.S. Bureau of Reclamation to address DMC discharges if a MAA is not established within 2 years from the effective date of this control program.

8. The Regional Board will review and update the load allocations and waste load allocations every 6 years from effective date of this control program. Any changes to waste load allocations and/or load allocations can be made through subsequent amendment to this control program. Changes to load allocations will be implemented through revisions of the applicable waste discharge requirements or waivers of waste discharge requirements. Changes to waste load allocations will be implemented through revisions of the applicable NPDES permits.
9. The Regional Board encourages real-time water quality management and/or pollutant trading of waste load allocations, load allocations, and supply water allocations as a means for attaining salt and boron water quality objectives while maximizing the export of salts out of the LSJR watershed.
10. The established waste load allocations, load allocations, and supply water allocations represent a maximum allowable level. The Regional Board may take other actions or require additional reductions in salt and boron loading to protect beneficial uses.

Implementation Priority

11. The Regional Board will focus control actions on the most significant sources of salt and boron discharges to the LSJR. Priority for implementation of load allocations to control salt and boron discharges will be given to sub-areas with the greatest unit area salt loading (tons per acre per year) to the LSJR (Table IV-5).

The priorities established in Table IV-5 will be reviewed every six years from the effective date of this control program.

Table VI-5: Priorities for implementing load allocations¹

| <u>Sub-area</u> | <u>Priority</u> |
|--|-----------------|
| <u>San Joaquin River Upstream of Salt Slough</u> | <u>Low</u> |
| <u>Grassland</u> | <u>High</u> |
| <u>Northwest Side</u> | <u>High</u> |
| <u>East Valley Floor</u> | <u>Low</u> |
| <u>Merced River</u> | <u>Low</u> |
| <u>Tuolumne River</u> | <u>Medium</u> |
| <u>Stanislaus River</u> | <u>Low</u> |
| <u>Delta Mendota Canal²</u> | <u>High</u> |

¹ Priorities based on the unit area salt loading from each sub-area and mass load from the DMC
² Delta Mendota Canal is not a subarea

Time Schedules for Implementation

12. The Regional Board will incorporate base load allocations into waste discharge requirements and real-time load allocations into conditions of waiver of waste discharge requirements within two years of the effective date of this control program. Dischargers regulated under a waiver of waste discharge requirements for dischargers participating in a real-time management program for the control of salt and boron in the LSJR shall file a notice of intent to comply with the waiver conditions within 1 year of the date of adoption of the waiver.
13. Existing NPDES point source dischargers are low priority and subject to the compliance schedules for low priority discharges in Table IV-6. New point source discharges that begin discharging after the date of the adoption of this control program must meet waste load allocations upon the commencement of the discharge.

Table IV-6: Schedule for Compliance with the load allocations for salt and boron discharges into the LSJR

| <u>Priority</u> | <u>Year to implement¹</u> | |
|--|---------------------------------------|--------------------------------|
| | <u>Wet through Dry Year Types</u> | <u>Critical Year Types</u> |
| <u>High</u> | <u>8</u> | <u>12</u> |
| <u>Medium</u> | <u>12</u> | <u>16</u> |
| <u>Low</u> | <u>16</u> | <u>20</u> |
| <u>¹number of years from the effective date of this control program</u> | | |

Table IV-7 Base Load Allocations, Real-time Load Allocations, Supply Water Credits, and Supply Water Allocations

| BASE LOAD ALLOCATIONS | | | | | | | | | | | | | |
|--|-----------------------|------------|------------|-------------------------|---------------------------------|-------------------------|------------|------------|------------|------------|------------|------------|------------|
| <u>Base Load Allocations (thousand tons)</u> | | | | | | | | | | | | | |
| <u>Year-type¹</u> | <u>Month / Period</u> | | | | | | | | | | | | |
| | <u>Jan</u> | <u>Feb</u> | <u>Mar</u> | <u>Apr 1 to Apr. 14</u> | <u>Pulse Period²</u> | <u>May 16 to May 31</u> | <u>Jun</u> | <u>Jul</u> | <u>Aug</u> | <u>Sep</u> | <u>Oct</u> | <u>Nov</u> | <u>Dec</u> |
| <u>Wet</u> | <u>41</u> | <u>84</u> | <u>116</u> | <u>23</u> | <u>72</u> | <u>31</u> | <u>0</u> | <u>0</u> | <u>5</u> | <u>45</u> | <u>98</u> | <u>44</u> | <u>36</u> |
| <u>Abv. Norm</u> | <u>44</u> | <u>84</u> | <u>64</u> | <u>26</u> | <u>71</u> | <u>14</u> | <u>0</u> | <u>0</u> | <u>0</u> | <u>44</u> | <u>58</u> | <u>35</u> | <u>32</u> |
| <u>Blw. Norm</u> | <u>22</u> | <u>23</u> | <u>31</u> | <u>11</u> | <u>45</u> | <u>8</u> | <u>0</u> | <u>0</u> | <u>0</u> | <u>38</u> | <u>41</u> | <u>34</u> | <u>30</u> |
| <u>Dry</u> | <u>28</u> | <u>39</u> | <u>25</u> | <u>5</u> | <u>25</u> | <u>1</u> | <u>0</u> | <u>0</u> | <u>0</u> | <u>25</u> | <u>31</u> | <u>27</u> | <u>28</u> |
| <u>Critical</u> | <u>18</u> | <u>15</u> | <u>11</u> | <u>0</u> | <u>0</u> | <u>0</u> | <u>0</u> | <u>0</u> | <u>0</u> | <u>19</u> | <u>30</u> | <u>26</u> | <u>23</u> |
| REAL-TIME LOAD ALLOCATIONS | | | | | | | | | | | | | |
| Nonpoint source dischargers operating under waiver of waste discharge requirements must participate in a Regional Board approved real-time management program and meet real-time load allocations. Loading capacity and real-time load allocations are calculated for a monthly time step. The following method is used to calculate real-time load allocations. Flows are expressed in thousand acre-feet per month and loads are expressed in thousand tons per month. | | | | | | | | | | | | | |
| Loading Capacity (LC) in thousand tons per month is calculated by multiplying flow in thousand acre-ft per month by the salinity water quality objective in $\mu\text{S/cm}$, a unit conversion factor of 0.8293, and a coefficient of 0.85 to provide a 15 percent margin of safety to account for any uncertainty. | | | | | | | | | | | | | |
| $LC = Q * WQO * 0.8293 * 0.85$ <p>where:</p> <p>LC = total loading capacity in thousand tons per month</p> <p>Q = flow in the Joaquin River at the Airport way Bridge near Vernalis in thousand acre-feet per month</p> <p>WQO = salinity water quality objective in $\mu\text{S/cm}$</p> | | | | | | | | | | | | | |
| The sum of the real-time Load Allocations (LA) for nonpoint source dischargers are equal to a portion of the LSJR's total Loading Capacity (LC) as described by the following equation: | | | | | | | | | | | | | |
| $LA = LC - L_{BG} - L_{CUA} - L_{GW} - \Sigma WLA$ <p>Where:</p> <p>LA = sum of the real-time Load Allocations for nonpoint source dischargers</p> <p>L_{BG} = loading from background sources</p> <p>L_{CUA} = consumptive use allowance</p> <p>L_{GW} = loading from groundwater</p> <p>ΣWLA = sum of the waste load allocations for all point sources</p> | | | | | | | | | | | | | |
| Background loading in thousand tons is calculated using the following equation: | | | | | | | | | | | | | |
| $L_{BG} = Q * 85 \mu\text{S/cm} * 0.8293$ | | | | | | | | | | | | | |

Table IV-7 Base Load Allocations, Real-time Load Allocations, Supply Water Credits, and Supply Water Allocations (continued)

Consumptive use allowance loading is calculated with the following equation:

$$L_{CUA} = Q * 230 \mu\text{S/cm} * 0.8293$$

Monthly groundwater Loading (L_{GW}) (in thousand tons)

| Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| 15 | 15 | 30 | 32 | 36 | 53 | 46 | 27 | 16 | 13 | 14 | 15 |

Waste load allocations for individual point sources are calculated using the following equation:

$$WLA = Q_{PS} * WQO * 0.8293$$

where:

WLA = waste load allocation in thousand tons per month

Q_{PS} = effluent flow to surface waters from the NPDES permitted point source discharger (in thousand acre-feet per month)

WQO = water quality objective in $\mu\text{S/cm}$

APPORTIONING OF LOAD ALLOCATION

An individual discharger or group of dischargers can calculate their load allocation by multiplying the nonpoint source acreage drained by the load allocation per acre.

$$\text{LA per acre} = \frac{\text{LA}}{\text{Total nonpoint source acreage}}$$

As of 1 August 2003, the total nonpoint source acreage of the LSJR Basin is 1.16-million acres.

Nonpoint source land uses include all irrigated agricultural lands (including managed wetlands).

Agricultural land includes all areas designated as agricultural or semi-agricultural land uses in the most recent land use surveys published by the California Department of Water Resources. California Department of Water Resources land use surveys are prepared and published on a county-by-county basis. Multiple counties or portions of counties may overlay a given sub-area. The land use surveys must be used in combination with a GIS to quantify the agricultural land use in each subarea. Nonpoint source land areas will be updated every 6 years though an amendment to the Basin Plan if updated California Department of Water Resources land use surveys have been published. The following land use surveys (or portions thereof) are used to quantify agricultural land use in the LSJR watershed.

| County | Year of most recent land use survey ¹ |
|-------------|--|
| Merced | 1995 |
| Madera | 1995 |
| San Joaquin | 1996 |
| Fresno | 1994 |
| Stanislaus | 1996 |

¹ as of 1 August 2003

Acreage of managed wetlands is based on the boundaries of the federal, private and state owned wetlands that comprise the Grassland Ecological Area in Merced County. Agricultural lands (as designated in DWR land uses surveys) within the Grassland Ecological Area are counted as a agricultural land use and not as managed wetlands. All other lands within the Grassland Ecological Area are considered to be managed wetlands.

Table IV-7 Base Load Allocations, Real-time Load Allocations, Supply Water Credits, and Supply Water Allocations (continued)

| SUPPLY WATER CREDITS | | | | | | | | | | | | | |
|---|----------------|-----|------|------------------|---------------------------|------------------|------|------|------|------|------|------|-----|
| A supply water credit is provided to irrigators in the Grassland and Northwest Side Subareas that receive water from the DMC. This DMC supply water credit is equal to 50 percent of the salt load delivered to Grassland and Northwest Side sub-areas. The following fixed DMC supply water credits apply to dischargers operating under base load allocations: | | | | | | | | | | | | | |
| DMC supply water credits (thousand tons) | | | | | | | | | | | | | |
| Year-type ¹ | Month / Period | | | | | | | | | | | | |
| | Jan | Feb | Mar | Apr 1 to Apr. 14 | Pulse Period ² | May 16 to May 31 | Jun | Jul | Aug | Sep | Oct | Nov | Dec |
| NORTHWEST SIDE SUBAREA | | | | | | | | | | | | | |
| Wet | 0.0 | 0.2 | 0.0 | 0.7 | 1.4 | 0.7 | 2.0 | 2.6 | 2.6 | 1.0 | 0.9 | 0.6 | 0.0 |
| Abv. Norm | 0.0 | 0.0 | 0.0 | 0.8 | 1.9 | 1.0 | 2.3 | 2.3 | 2.6 | 1.2 | 0.8 | 0.3 | 0.0 |
| Blw. Norm | 0.0 | 0.0 | 0.0 | 1.0 | 2.6 | 1.5 | 3.4 | 4.2 | 3.3 | 2.5 | 1.9 | 0.8 | 0.0 |
| Dry | 0.0 | 0.0 | 0.0 | 0.1 | 0.3 | 0.2 | 0.3 | 0.5 | 0.5 | 0.2 | 0.2 | 0.0 | 0.0 |
| Critical | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| GRASSLAND SUBAREA | | | | | | | | | | | | | |
| Wet | 2.1 | 5.9 | 13.9 | 7.8 | 17.3 | 8.8 | 22.6 | 20.8 | 23.2 | 17.2 | 16.0 | 10.4 | 3.7 |
| Abv. Norm | 1.2 | 4.8 | 9.4 | 10.4 | 24.7 | 13.6 | 27.6 | 20.3 | 24.5 | 23.9 | 16.6 | 7.5 | 2.6 |
| Blw. Norm | 1.4 | 5.7 | 13.8 | 12.5 | 29.5 | 15.9 | 32.6 | 29.2 | 29.8 | 32.9 | 25.3 | 12.8 | 4.5 |
| Dry | 2.2 | 6.7 | 15.9 | 11.1 | 23.4 | 11.2 | 22.9 | 23.1 | 24.0 | 28.0 | 23.7 | 13.0 | 5.3 |
| Critical | 3.3 | 8.9 | 17.2 | 10.2 | 24.1 | 13.3 | 33.3 | 32.5 | 31.8 | 27.5 | 28.7 | 13.6 | 5.9 |
| The following method is used to calculate real-time DMC supply water credits in thousand tons and applies to dischargers operating under real-time load allocations. | | | | | | | | | | | | | |
| Real-time CVP Supply Water Credit = $Q_{CVP} \cdot C_{CVP} \cdot 0.8293 \cdot 0.5$ | | | | | | | | | | | | | |
| Where: | | | | | | | | | | | | | |
| Q_{CVP} = volume of water delivered from CVP in thousand acre-feet | | | | | | | | | | | | | |
| C_{CVP} = electrical conductivity of water delivered from CVP in $\mu\text{S/cm}$ | | | | | | | | | | | | | |
| For irrigators in the Northwest Side Subarea an additional supply water credit is provided to account for salts contained in supply water diverted directly from the LSJR (LSJR diversion water credit). The LSJR diversion credit is equal to 50 percent of the salt load in supply water diverted from the San Joaquin River between the confluence of the Merced River and the Airport Way Bridge near Vernalis. The following fixed LSJR supply water credits apply to dischargers operating under base load allocations: | | | | | | | | | | | | | |
| LSJR supply water credits (thousand tons) | | | | | | | | | | | | | |
| Year-type ¹ | Month / Period | | | | | | | | | | | | |
| | Jan | Feb | Mar | Apr 1 to Apr. 14 | Pulse Period ² | May 16 to May 31 | Jun | Jul | Aug | Sep | Oct | Nov | Dec |
| Wet | 0.0 | 0.6 | 9.2 | 6.2 | 9.4 | 11.0 | 17.2 | 23.5 | 20.5 | 9.5 | 1.3 | 0 | 0 |
| Abv. Norm | 0.0 | 0.8 | 5.0 | 7.4 | 12.3 | 11.2 | 21.8 | 24.9 | 20.3 | 10.7 | 1.5 | 0 | 0 |
| Blw. Norm | 0.0 | 0.6 | 5.5 | 7.0 | 14.4 | 13.4 | 27.3 | 33.1 | 24.9 | 13.9 | 2.4 | 0 | 0 |
| Dry | 0.0 | 0.7 | 5.3 | 6.4 | 11.1 | 10.7 | 27.5 | 34.0 | 20.3 | 11.4 | 2.4 | 0 | 0 |
| Critical | 0.0 | 0.8 | 4.5 | 5.1 | 14.8 | 10.6 | 25.2 | 28.5 | 22.3 | 8.7 | 2.5 | 0 | 0 |

Table IV-7 Base Load Allocations, Real-time Load Allocations, Supply Water Credits, and Supply Water Allocations (continued)

The following method is used to calculate Real-time DMC supply water credits in thousand tons and applies to dischargers operating under real-time load allocations.

$$\text{Real-time LSJR Supply Water Credit} = Q_{\text{LSJR DIV}} * C_{\text{LSJR DIV}} * 0.8293 * 0.5$$

Where:

$Q_{\text{LSJR DIV}}$ = volume of water diverted from LSJR between the Merced River Confluence and Airport Way Bridge near Vernalis in thousand acre-feet

$C_{\text{LSJR DIV}}$ = electrical conductivity of water diverted from the LSJR in $\mu\text{S/cm}$

SUPPLY WATER ALLOCATIONS

The U.S. Bureau of Reclamation DMC load allocation (LA_{DMC}) is equal to the volume of water delivered from the DMC (Q_{DMC}) to the Grassland and Northwest side Sub-areas at a background Sierra Nevada quality of 85 $\mu\text{S/cm}$.

$$LA_{\text{DMC}} = Q_{\text{DMC}} * 85 \mu\text{S/cm} * 0.8293$$

¹The water year classification will be established using the best available estimate of the 60-20-20 San Joaquin Valley water year hydrologic classification (as defined in Footnote 17 for Table 3 in the State Water Resources Control Board's *Water Quality Control Plan for the San Francisco Bay/Sacramento-San Joaquin Delta Estuary*, May 1995) at the 75% exceedance level using data from the Department of Water Resources Bulletin 120 series. The previous water year's classification will apply until an estimate is made of the current water year.

²Pulse period runs from 4/15-5/15. Period and distribution of base load allocation and supply water credits between April 1 and May 31 may change based on scheduling of pulse flow as specified in State Water Board Water Rights Decision 1641. Total base load allocation for April 1 through May 31 does not change but will be redistributed based on any changes in the timing of the pulse period.

SKIP AHEAD IN CHAPTER IV

ESTIMATED COSTS OF AGRICULTURAL WATER QUALITY CONTROL PROGRAMS AND POTENTIAL SOURCES OF FINANCING

San Joaquin River Subsurface Agricultural Drainage Control Program

The estimates of capital and operational costs to achieve the selenium objective for the San Joaquin River range from \$3.6 million/year to \$27.4 million/year (1990 dollars). The cost of meeting water quality objectives in Mud Slough (north), Salt Slough, and the wetland supply channels is approximately \$2.7 million /year (1990 dollars).

Potential funding sources include:

1. Private financing by individual sources.
2. Bonded indebtedness or loans from governmental institutions.
3. Surcharge on water deliveries to lands contributing to the drainage problem.
4. Ad Valorem tax on lands contributing to the drainage problem.
5. Taxes and fees levied by a district created for the purpose of drainage management.
6. State or federal grants or low-interest loan programs.
7. Single-purpose appropriations from federal or State legislative bodies (including land retirement programs).

Pesticide Control Program

Based on an average of \$15 per acre per year for 500,000 acres of land planted to rice and an average of \$5 per acre per year for the remaining 3,500,000 acres of irrigated agriculture in the Sacramento and San Joaquin River Basins, the

total annual cost to agriculture is estimated at \$25,000,000. Financial assistance for complying with this program may be obtainable through the U.S.D.A. Agricultural Stabilization and Conservation Service and technical assistance is available from the University of California Cooperative Extension Service and the U.S.D.A. Soil Conservation Service.

San Joaquin River Salt and Boron Control Program

The estimates of capital and operational costs to implement drainage controls needed to achieve the salt and boron water quality objectives at the Airport Way Bridge near Vernalis range from 27 to 38 million dollars per year (2003 dollars).

Potential funding sources include:

1. Those identified in the San Joaquin River Subsurface Agricultural Drainage Program and the Pesticide Control Program.
2. Annual fees for waste discharge requirements.